

VANDERBILT



UNIVERSITY

*Vice Chancellor for Public Affairs*

Chairman Tom Coburn  
Subcommittee on Federal Financial Management  
United States Senate  
Attn: Anna Shopen  
439 Hart Senate Office Building  
Washington, DC 20510

By Fax: 202-228-3796

Dear Senator Coburn:

I am writing in response to your request for information about the federal appropriations that Vanderbilt University receives for research. We highly value our position as one of the nation's leading research universities, and we recognize our obligation to be responsible stewards of the taxpayers' investment. In turn, we believe we provide excellent results and value for the federal research dollars received.

Responses to your questions are attached. Although your letter makes reference in some instances to "appropriations," we have generally confined our answers to "earmarked" appropriations because we understand that to be the focus of your inquiry.

I want to emphasize that, throughout the period covered by your request, our earmark activity has been limited to a handful of important and highly credible projects. These projects have been carefully selected based on their potential applications, and they take advantage of some of Vanderbilt's greatest research strengths. Following a careful evaluation of each earmark proposal, we move forward only on those that are directly connected to the strategic mission of the university.

It also is important to note that we do not seek or accept earmarked appropriations for which there are peer-reviewed funding sources. We place a premium on proposals that involve collaboration among institutions because we believe the infusion of multiple ideas and institutional capabilities often creates the optimum environment for scientific and technological research.

In addition, each of these requests has been handled in a straightforward and visible process that begins early each year in consultation with several members of the Tennessee delegation. We greatly appreciate the delegation's careful review of our proposals and their willingness to support the outstanding research at Vanderbilt.

Sincerely,

Michael J. Schoenfeld  
Vice Chancellor for Public Affairs

*1. Please provide a list of all appropriations received by your institution from the year 2000 to present, and the amounts of assistance received.*

<b>Project</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>	<b>FY 2006</b>
Monroe Carell, Jr. Children's Hospital	xxx	xxx	1,200,000	1,250,000	xxx	xxx	xxx
Advanced Carbon Nanotechnology Program <sup>1</sup>	xxx	xxx	xxx	xxx	648,000	422,000	789,000
Advanced Proteomics Program	xxx	xxx	xxx	xxx	1,200,000	1,500,000	4,000,000
Manganese Health Research Program <sup>2</sup>	xxx	xxx	xxx	xxx	xxx	280,000	500,000
Vigilance System Surgical Safety Advanced Technology	xxx	xxx	xxx	xxx	xxx	xxx	1,500,000

<sup>1</sup> This is a multi-institutional program that also includes: North Carolina State University, the University of Florida, the University of Kentucky, and the International Technology Center (Research Triangle Park, NC). The amounts shown above are Vanderbilt's share of the total earmark.

<sup>2</sup> This program is administered by the Vanderbilt University Medical Center, which is now the home of the principal investigator (PI). The amounts shown above are Vanderbilt's share of the total earmark, including direct and administrative costs. Additional earmarked funds are disseminated to several additional research "cores" in the U.S. and abroad. This program was not requested by Vanderbilt or coordinated with our Congressional delegation; the PI brought this program with him from another institution when he moved to Vanderbilt.

**ADDITIONAL NOTE:** In FYs 2000-06, Vanderbilt University received federal research appropriations for the Medical Free Electron Laser Program, a multi-institutional initiative that also includes: Duke University, The Beckman Laser Institute at the University of California at Irvine, Stanford University, and the Wellman Laboratories at Harvard Medical School. Although "member requests" are submitted for this program, we do not consider it an earmark. It is a competitive, peer-reviewed program, and it is included annually as a line-item in the White House budget request for the Department of Defense. Vanderbilt and its partners normally seek an increase for that budget request.

*2. Please provide a summary of the specific objectives or goals set to be achieved by any entity, program, project or service associated with an appropriation at your institution, and, for each appropriation, a list of accomplishments that can be attributed to the project, entity, program or service (e.g., published peer reviewed research, etc., depending on the nature of the earmarks your institution has received).*

(See appendix.)

*3. How does your institution set a measure for standards to achieve quality and outcomes for entities, programs, projects or services receiving assistance through earmarks or appropriations?*

Vanderbilt evaluates each program in a manner appropriate to the objectives of that program. There is no "one-size-fits-all" measurement suitable for the diverse research findings and public service made possible by the federal funds we receive. For example, our new Monroe Carell, Jr. Children's Hospital might consider the various ways it has met the ever-growing needs of a truly regional service area comprising 700,000 children (e.g., increased admissions, treatments or visits). Our Advanced Proteomics Program might look at any number of "reportable outcomes" during its first full year, such as: 14 seminars and lectures at domestic and international scientific meetings; and the presentation of 4 abstracts at the annual meeting of the American Society for Mass Spectrometry.

In addition, we have found that the federal agencies that sponsor these programs are normally very active in evaluating outcomes against stated objectives. For example, the Army Research Laboratory, which funds our Advanced Carbon Nanotechnology Program, has made site visits to Vanderbilt, actively participated in program reviews and workshops, invited the Vanderbilt program manager to their R&D planning sessions, and received regular progress reports from us.

Examples of specific research accomplishments can be found in the appendix to this report.

*4. Does your institution have a stated policy regarding Congressional earmarks or appropriations (if so, please describe)? Does your institution have a policy regarding partnering in research projects with other universities who may have a differing policy?*

Vanderbilt carefully evaluates and closely coordinates its earmark requests across the entire institution. Proposals from our faculty far exceed the number of proposals submitted to Congress for its consideration. No request is made without prior approval of 1) the relevant dean or comparable official and 2) the University's central administration. In addition, all requests are managed by Vanderbilt's Office of Federal Relations, which works closely with -- and receives significant support from -- our congressional delegation.

In evaluating earmark requests, Vanderbilt's administration considers several factors. Among the most important are: the potential of the research to advance scientific knowledge and the quality of life; the relationship of the request to the University's overall strategy for research and academics; the maturity of initial planning for the research program; and whether other sources of funding, including competitive, peer-reviewed grants and contracts, have been thoroughly explored.

Vanderbilt highly values research partnerships with other leading institutions, and this is reflected in some of our earmark requests. We believe such partnerships can enhance the quality of the research because each partner brings different strengths, resources and capabilities to the endeavor. Our primary consideration in establishing partnerships is whether the other institution will add to the quality of the research. We also require that non-Vanderbilt researchers have the support of their central administrations.

*5. Has your institution considered hiring a lobbyist to assist your institution in attaining familiarity with the opportunities that may exist to obtain Federal funds for research -- such as the earmarking process?*

Vanderbilt reserves the right to engage outside lobbyists, consultants and advisers to provide expert advice on a wide range of federal issues. At the current time, however, we have no plans to hire a lobbyist to assist in future appropriations/earmark efforts. We believe that, under most circumstances, Vanderbilt is best represented in the Congress by its own faculty and administration.

*6. In conclusion, do you find Congressionally earmarked funds to have contributed in a substantive way to your academic institution?*

Vanderbilt is among the nation's leading institutions in winning competitive, peer-reviewed research grants from federal agencies. Our earmarks are small by comparison. However, we believe they are a very valuable element of our overall research portfolio, creating research opportunities that otherwise might go unfulfilled. As noted earlier, they are carefully selected based on numerous important factors, including their potential contribution to Vanderbilt's strategic mission. The driving force is the quality of the research and its potential contribution to national needs.

We strongly believe the research made possible by these earmarks is contributing substantively not only to our institution, but also to the nation's scientific and technological resources. It is no accident that our earmark experience has been limited almost exclusively to research aimed at advancing regional and national capabilities in defense and healthcare.

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## **APPENDIX: OBJECTIVES AND ACCOMPLISHMENTS**

### **Monroe Carell Jr. Children's Hospital**

The Monroe Carrell Jr. Children's Hospital at Vanderbilt University opened in February 2004. This \$270-million pediatric center is designed to meet the specialized healthcare needs of approximately 700,000 children in a service area covering middle-Tennessee, southwest Kentucky and northeastern Alabama. It is a key part of the national network of full-service "safety net" hospitals that provide care for all children, including the under- and uninsured. It is an open-access facility.

Federal funding in FY 2002 helped Children's Hospital obtain technologically advanced equipment for the neonatal intensive-care unit, pediatric intensive-care unit and the operating suite. In FY 2003, such funding allowed the acquisition of technologically advanced equipment for acute care and the operating suite, as well as biohazardous hoods for the pharmacy. In addition, federal funds were used in the construction of a pedestrian bridge over the heavily used street (including emergency vehicles) that separates the Children's Hospital from the Vanderbilt University Medical Center.

### **Advanced Carbon Nanotechnology Program**

Headquartered at Vanderbilt, this multi-institutional program is developing new technology that will be applied in the rapidly growing area of carbon nanotechnology to improve biosensors, energy conversion and soldier and weapons armament. The team of researchers has complementary and unique skills in designing and manipulating carbon atoms and fabricating materials to a level that will greatly enhance the Army's capabilities. The long-term goal of this program is new state-of-the-science carbon-based nano-wires, nano-tubes and diamond films that can be assembled at the molecular level to achieve unprecedented advances in technology such as:

- chemical and biological agent detection through fingerprints;
- projectile-defeating, energy-recovering shielding for land, sea or aerospace vehicles;
- means of accelerating cell growth, thereby yielding improved wound-healing;
- more efficient solar energy conversion; and
- high-speed and inexpensive sources of electronics.

The combined efforts of the program's participants have yielded the type of important results anticipated by the U.S. Army. Following are selected examples of these results:

- In concert with the Army Research Laboratory at Delphi, Vanderbilt is developing extremely high electric-current nanocarbon emitters that will energize a new generation of ultraviolet (UV) lasers. Only materials like nanocarbon can "practicalize" UV lasers. This is very important, because most biological/organic materials have sensitivity interactions with UV illumination. The success of explosive and biochemical detectors

will depend on the UV lasers this program is helping to develop. Clouds and other atmospheric blockages stop infrared; not so for UV. A powerful beam from a UV laser has the potential to be a formidable weapon, from tactical (e.g., Humvee-to-building) to strategic (e.g., ground-to-missile) situations.

- A key attribute of the program is the development of diamond nanoparticles, only a few carbon atoms in diameter, as a chemical delivery "nano-platform." Researchers on our team are "functionalizing" (attaching to) the surface of these nano-diamonds with various sensing molecules that provide *selective* detection of viruses, bacteria, explosive chemicals and other materials of interest that literally light up the bad compounds if they are present. A very interesting spin-off of this technology, under development with one of our Program team members, is the use of the diamond nano-platform as a drug or gene *delivery agent*. The nanodiamond has very compatible properties with cellular material and can serve as a benign "messenger," carrying intended (attached) molecules that otherwise could not get to the medically intended target -- be it the chromosomal level of a cell, or "in the lap" of an occupying unwanted virus already inside a cell -- to decorate or annihilate it.
- Vanderbilt's thrust in innovation for *energy conversion* has moved the cold-cathode nanocarbon emitters from the lab bench into an electronic package you can hold in your hand, a critical first step to applying this phenomenon, which converts heat *directly* into electricity without generators. The Army is very interested in the portable power aspects of this technology.

Also at Vanderbilt:

- Development of a new, advanced nanocarbon electronic device that works at temperatures 400 degrees higher than silicon -- the present technology. This same device has been shown to function at radiation levels three times higher than any conventional electronics can survive.
- Publication in the journal "Science" of a paper describing a breakthrough in using nanotechnology for storing hydrogen. This is not only relevant to the Army's vital needs for portable power, but of significant potential for the overall "hydrogen economy" national initiative.
- Several breakthroughs in chemical and biological sensors and evasion -- new carbon nanotechnology materials and processes that will provide the basis for systems which can effectively detect and neutralize most of the known and derivable hostile chemicals and biological agents that could be used against the American public.

### **Advanced Proteomics Program**

A major goal of the Advanced Proteomics Program is the rapid integration of new mass spectrometry-related technologies and approaches in projects focused on the early detection of diseases and more effective means of monitoring the impact of therapeutic interventions on individual patients. A second goal is the development of expertise and technologies for the rapid detection and response to public health emergencies caused by threats such as biological and chemical agents. Over a broader range, the advanced proteomics program at Vanderbilt can provide expertise and training in the use of proteomic technologies for investigators from DOD, and other government agencies focused on emergency health threats.

To achieve these goals, work accomplished during the program's first annual report (covering March 2005 through April 2006) included:

1. Protocol/sample preparation procedures for direct analysis of colorectal tissue samples.
2. Receipt, installation, testing and validation of a high resolution FTMS, especially for use in the analysis of tissues.
3. Protein analysis of 53 colorectal tissue biopsies using profiling/imaging MALDI MS technology.
4. Initiation of biocomputational protocols for data mining and marker discovery of colorectal samples.

Recent discoveries from the P.I.'s lab as well as others suggest the protein patterns in disease contain a great deal of prognostic information, and that the expression profile may be a type of protein code or molecular roadmap that, once understood, will allow investigators to assess the changing metabolic state and future course of these changes. The central question is, to what extent does the dynamic state of protein expression profile codes in disease predict the course and outcome, especially if assessed at early stages of the disease? Similarly, to what extent can the clinician use this information with high confidence to predict the presence of the disease at an early stage, the rate of progression, prognosis, and effectiveness of therapy? Moreover, can such patterns predict the risk of disease in nominally healthy individuals?

The focus and outcome of this grant involves the utilization of current mass spectrometry technologies and development of new technologies that provides a wide view and a truly global representation of the proteins in healthy and disease tissue. Protein expression levels are enormously different, encompassing the range of a single copy of a protein per cell to many millions of copies per cell. Moreover, their chemistries can vary widely, from hydrophobic to hydrophilic properties with an enormous variety of possible post-translational modifications. These factors present formidable challenges that go far beyond current technologies.

### **Manganese Health Research Program**

Manganese is a critical metal in many defense and defense-related private sector applications including steel-making and fabrication, improved fuel efficiency, and welding, and a vital and large component in portable power sources (batteries). At the current time, there is much debate concerning the potential adverse health effects of the use of manganese in these and other applications. Due to the significant use of manganese by the Department of Defense, its contractors and its suppliers, the program seeks to use the resources of the federal government, in tandem with manganese researchers, as well as those industries that are involved with manganese, to determine the exact health effects of manganese, as well as to devise proper safeguard measures for both public and private sector workers.

The program just got underway last year, and eight new projects were added to the research plan in 2006. The following are the objectives of the program:

- define the scope of the contributions of environmental and occupational manganese exposure to health, disease and dysfunction;
- identify and investigate factors, such as age, nutritional deficiencies, pre-existing disease, and genetics, that make individuals more susceptible to the effects of manganese;
- develop common exposure assessment protocols and exposure reconstruction methodologies;
- determine whether manganese plays a role in increasing the relative risk for the development of idiopathic Parkinson's disease in welders;
- identify biomarkers for the diagnosis of the potential adverse effects of manganese, taking account of other factors such as diet (i.e. iron deficiency);
- understand the physiological mechanisms that govern manganese accumulation within the brain, with special emphasis on the role of olfactory transport of the metal;
- provide new modalities for the treatment of excessive manganese exposure (i.e. iron repletion);
- provide data to health forum regulators on which sound regulatory and risk assessment may be based;
- provide timely research activity awareness services to health professionals and the manganese industry and its workers; and
- support innovative, multidisciplinary research, in humans and animal models, on the specific cellular, molecular, and physiologic mechanisms by which manganese mediates possible adverse health effects.



### **Vigilance System Surgical Safety Advanced Technology**

The Vigilance System© uses advanced information technology to provide continuous remote monitoring and improved management of patients in critical care environments. The capabilities of this system are consistent with the Department of Defense vision of the "Operating Room of the Future," and the system can be deployed in battlefield and civilian mass casualty settings.

The system is a robust information technology solution designed to minimize surgical care errors. It monitors all patient and systems data in surgical and critical-care settings and sends alerts to the clinician. This allows the clinician to focus on the critical information needed to make timely decisions with the greatest impact on desired outcomes. The system also provides checklists to assist in managing acute events. When further developed, the system will use historical information to generate "smart alarms" that predict adverse events before they occur.

The system also improves the efficiency of surgical care. This is accomplished by integrating data derived from several sources, including patient monitors, electronic medical records, and operating room video cameras, and transmitting it to a computer worn by a mobile clinician. Thus, the clinician can view all critical physiologic and care process information for multiple patients in multiple locations.

Although the program is new and is just starting to receive its federal funds, it recently reported the following developments:

- The system has just been implemented in the last of our adult operating rooms where we will complete the surgical outcome studies.
- We are actively installing the system in 2 additional ICUs (burn ICU and cardiovascular ICU) so that we can begin our critical care outcomes studies.
- By mid-August we will have completed the installation of the wireless monitoring system on two postoperative floors so that we can begin our study on those patients and Medical Response Teams by September 1.
- We have hired the staff to perform our studies including a PhD human factors researcher and a research nurse with expertise in clinical trials.
- We are creating the Perioperative Data Warehouse that will be used to create the rules for our intelligent alerting system, and testing the software algorithms for the alerts.
- We are attending several meetings and symposia associated with advanced IT and healthcare, including those associated with the DOD combat casualty initiative.
- We are having planning meetings with the Nashville VA Medical Center to plan a test installation of our systems there.

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